EOS Mission Support Network Performance Report

This is a monthly summary of EMSnet performance testing -- comparing the performance against the requirements. Currently using updated BAH requirements, including missions through 2006

All results are reported on the web site:
http://corn.eos.nasa.gov/performance/Net_Health/EMSnet_list.html.
It shows MRTG-like graphs of the performance to various test sites, including thruput, RTT, packet loss, and hops, with 1 week, 2 month and 6 month graphs.

Highlights:

- ASF: A problem began 23 October. Outflow dropped from 3 mbps to 1.5 mbps, indicating that only a single T1 was effectively in use. The outflow problem was fixed on 1 November. However, the inbound flow became erratic at the same time, with a high packet low rate. The inbound problem was not fixed until late November.
- NSIDC: found that using fewer parallel TCP streams improved performance. So reduced the number of streams (from 5 to 3) and future rating improved from Low to Adequate. This condition was resolved as being due to the use of a half-duplex interface on the NSIDC test host. Switched to a new host in November, with further improvement.
- EDC: Performance from GSFC improved slightly, improving the rating.
- Other tests had stable results.

Ratings Changes:

Upgrades: ↑:
EDC: Adequate → **Good**

Downgrades: ↓: None

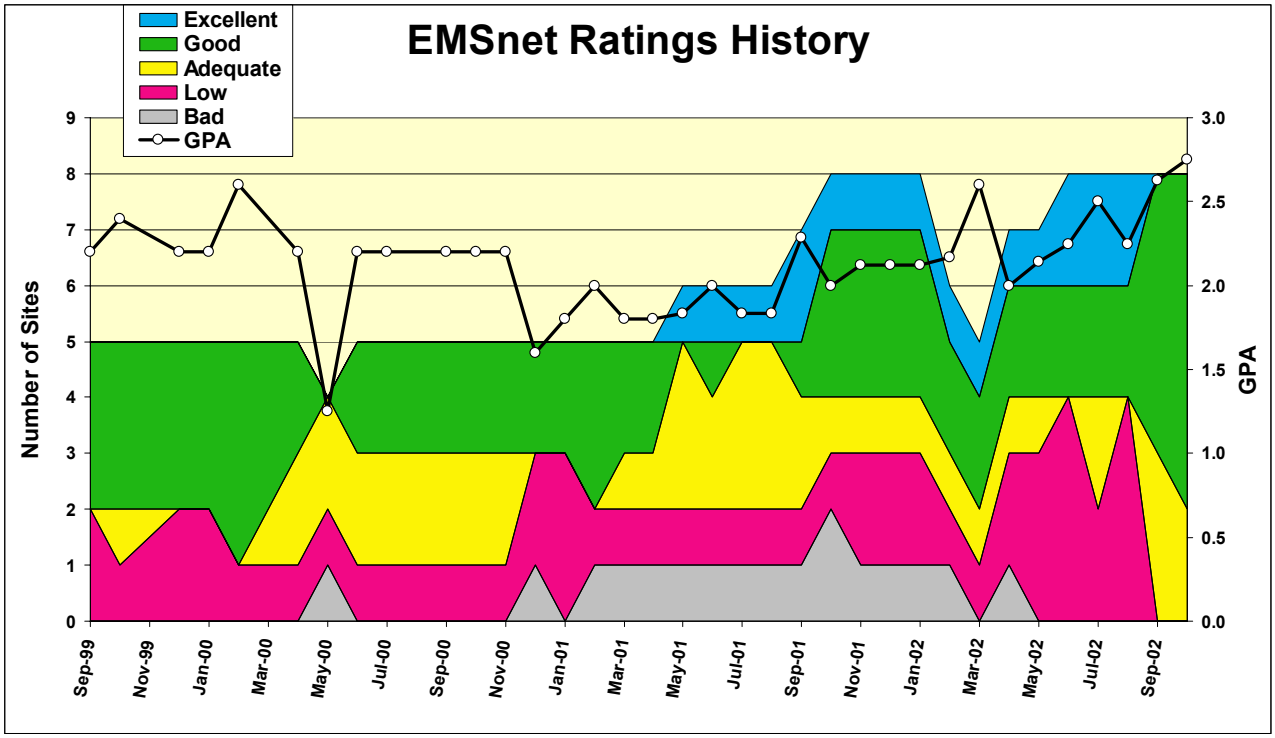
Rating Categories:

Excellent: **Total Kbps** > Requirement * 3
Good: 1.3 * Requirement <= **Total Kbps** < Requirement * 3
Adequate: Requirement < **Total Kbps** < Requirement * 1.3
Low: **Total Kbps** < Requirement.
Bad: **Total Kbps** < Requirement / 3

Where Total Kbps = MRTG + iperf monthly average

Ratings Summary:

The chart below shows the number of sites in each classification since EMSnet testing started in September 1999. Note that these ratings do NOT relate to absolute performance -- they are relative to the EOS requirements. The GPA is calculated based on Excellent: 4, Good: 3, Adequate: 2, Low: 1, Bad: 0



EMSnet Sites:
Network Requirements vs. Measured Performance

October 2002		Requirements (kbps)		Testing							
Source -> Destination	Team (s)	Current (Oct '02)	Future (Dec '03)	Source Node : Test Period	MRTG Avg kbps	Perf Avg kbps	Total Avg kbps	Current Status re Oct '02*	Prev Stat	Current Status re Dec '03*
ASF-> NOAA	ADEOS II	1613	1613	ASF->NESDIS: 01-Oct-02 - 31-Oct-02	392	2563	2955	GOOD	G	GOOD
GSFC->EDC	MODIS, LandSat	147233	227988	DOORS-EDCTest: 19-Aug-02 - 31-Oct-02	64480	143074	207554	GOOD	A	LOW
GSFC->ERSDAC	ASTER	467	467	GDAAC: 04-Jun-02 - 31-Oct-02	73	771	844	GOOD	G	GOOD
GSFC -> JPL	QuikScat, TES, MLS, etc.	2825	6894	CSAFS: 15-Aug-02 - 31-Oct-02	609	5901	6510	GOOD	G	LOW
GSFC->LARC	CERES, MISR, MOPITT	38346	59979	GDAAC: 18-Aug-02 - 31-Oct-02	12900	69887	82787	GOOD	G	GOOD
US ->NASDA	QuikScat, TRMM, AMSR	1854	1620	CSAFS: 23-Aug-02 - 31-Oct-02	500	1814	2314	Adequate	A	GOOD
NASDA->US	AMSR	1374	1374	NASDA-EOC: 01-Sep-02 - 31-Oct-02	95	1280	1375	Adequate	A	Adequate
GSFC-> NSIDC	MODIS	29249	53111	GDAAC: 23-Oct-02 - 31-Oct-02	9205	48881	58086	GOOD	G	Adequate

Notes: All flow requirements listed are the greater of inflow or outflow

Flow Requirements (from BAH) include TRMM, Terra , Aqua, QuikScat, ADEOS II

***Criteria:**

Excellent	**Total Kbps** > Requirement * 3	
GOOD	1.3 * Requirement <= **Total Kbps** < Requirement * 3	
Adequate	Requirement < **Total Kbps** < Requirement * 1.3	
LOW	**Total Kbps** < Requirement	
BAD	**Total Kbps** < Requirement / 3	

Change History:

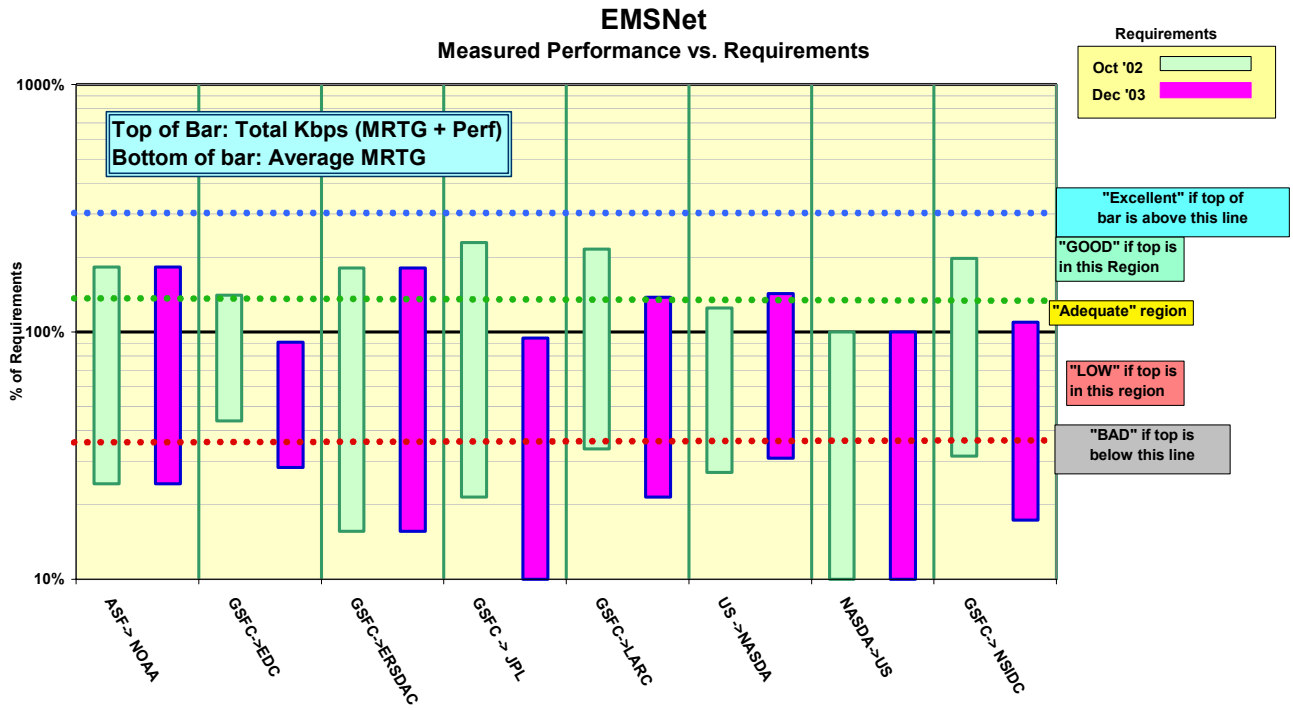
27-Sep-99	Original - TRMM, Terra, and QuikScat
19-Jan-01	Incorporated BAH requirements including additional missions
9-Apr-01	Updated BAH requirements
4-Jun-01	Added 50% contingency to BAH requirements
16-Nov-01	Added MRTG to Iperf, updated requirements, Revised criteria
2-Oct-02	Updated to revised BAH requirements

Ratings Summary

	vs Oct '02		vs Dec '03
	Score	Prev	Score
Excellent	0	0	0
GOOD	6	5	4
Adequate	2	3	2
LOW	0	0	2
BAD	0	0	0
Total	8	8	8
GPA	2.75	2.63	2.25

Comparison of measured performance with Requirements:

This graph shows three bars for each destination. Each bar uses the same actual measured performance, but compares it to the requirements for two different times (Oct '02, and Dec. '03). Thus as the requirements increase, the same measured performance will be a bit lower in comparison.



Note: this chart shows that the performance to all sites is remarkably close to requirements. In the past, some sites have had performance way above the requirements, others way below. But now there are NO sites rated “Excellent”, “Low”, or “Bad” – all are either “Good” or “Adequate”!

Also note that the interpretation of these bars has changed from Sept '01. The bottom of each bar is the average measured MRTG flow to that site (previously daily minimum). Thus the bottom of each bar can be used to assess the relationship between the requirements and actual flows. Note that the requirements include a 50% contingency factor above what was specified by the projects, so a value of 66% would indicate that the project is flowing as much data as requested.

Details on individual sites:

1) ASF → CONUS: Rating: Continued Good

Test Results:

Source → Dest	Medians of daily tests (kbps)				
	Best	Median	Worst	MRTG	TOTAL
ASF → NESDIS	2579	2563	750	392	2955
ASF → GSFC-CSAFS	2353	1731	591		

Requirements:

Source → Dest	FY	mbps	Rating
ASF → NESDIS	'02, '03	1.61	Good

Comments: The 2.9 mbps total is very good for a 2 * T1 (3.1 mbps) circuit with competing flows. Since this is more than 30% over the Oct '02 requirement, the rating is "Good".

Although outflow from ASF has remained rated Good, there was a problem from 23 October until 1 November, when it appeared that only a single T1 was being used for outflow – thruput to all destinations was limited below 1.5 mbps during that period.

More significantly, however, was the drop in inflow capability at the same time. Performance is erratic, errors are high, and it still has not recovered!

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2) GSFC → EDC: Rating: ↑ Adequate → Good

Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	MRTG	TOTAL
DOORS → EDC Test	224.2	143.1	72.6	64.5	208.6
DOORS → EDC DAAC	200.7	140.8	64.5		
G-DAAC→ EDC DAAC	158.8	85.9	37.2		

Requirements:

Date	mbps	Rating
Oct '02	147.2	Good
Dec '03	228.0	Low

The three test cases above show the effects of the DAAC firewalls: the test shown on the top row has no firewalls in the path, just vBNS+. The next test goes through the EDC firewall, and the last test goes through both the GSFC and EDC firewalls. The firewalls thus do appear to have a significant impact on performance – at least at these high rates.

The combined MRTG + thruput now more than 30% above the reduced Oct '02 requirement (the requirement had been 250 mbps previously), increasing the rating again, now to to “Good”. But performance is still below the Dec '03 requirement.

3) JPL:

Rating: Continued **Good**

Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	MRTG	TOTAL
GSFC-CSAFS → JPL-SEAPAC	6.1	5.9	3.7	0.6	6.5
LaRC DAAC → JPL-TES	6.0	5.9	4.5		
GSFC DAAC → JPL-TES	20.0	15.5	3.6		
GSFC-MTVS1 → JPL-PODAAC	6.0	5.7	4.8		
NASDA-EOC→ JPL-SEAPAC	2.3	2.3	1.2		
ASF→ JPL-SEAPAC	2.8	2.7	1.3		

Requirements:

Source → Dest	Date	mbps	Rating
GSFC → JPL combined	Oct '02	2.82	Good
GSFC → JPL combined	July '03	7.40	Low
LaRC DAAC → JPL-TES	July '03	4.58	Good

The GSFC-JPL requirement above was revised in August revised to includes all flows on the GSFC-JPL circuit, including flows from LaRC and flows to NASDA and ASF. The rating is based on testing via EMSnet from CSAFS at GSFC to SEAPAC at JPL. Note that the MRTG value above also includes these flows. However, MRTG data for GSFC → JPL is unavailable for October, so the September value will be used here instead.

Performance on this circuit improved on 15 August (was typ. 3.9 mbps), due to BOP switchover. However, with the increased combined requirement of 2.8 mbps (prev 0.9 mbps), the performance rates only as “Good”. Adding in the 4.6 mbps of Aura requirements from LaRC, the performance is below the combined 7.4 mbps requirement next July.

Performance from LDAAC to JPL-TES also improved from 2.9 to 6.0 mbps on Aug 15 due to BOP.

The route from GDAAC to JPL-TES is still NISN SIP (since May 8). Performance improved substantially as a result. However, this is only a temporary route for this flow -- the intended route is via EMSnet, which should be installed after the GSFC LAN upgrade is complete.

Testing from GSFC-DAAC to JPL-PODAAC is also currently routed via NISN SIP, so EMSnet testing is performed from MTVS1. On 15 August, Performance improved due to BOP, from 3.3 mbps median (somewhat noisy) to 5.7 mbps steady.

NASDA → JPL-SEAPAC testing was restored on 2October. Thruput is very stable at 2.3 mbps typical. Performance is better than from NASDA to GSFC, due to the shorter RTT somewhat mitigating NASDA’s TCP window size limitation.

ASF → JPL-SEAPAC thruput was steady at about 2.7 mbps, using the 2 T1s.

4) GSFC → LaRC:

Rating: Continued **Good**

Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	MRTG	TOTAL
GDAAC → LDAAC	88.5	69.9	40.7	12.9.9	82.8

Requirements:

Date	mbps	Rating
Oct '02	38.3	Good
Dec '03	60.0	Good

Performance increased slightly (Total was 78 mbps last month), still rated "Good" compared to reduced requirements (requirement was 113 mbps previously). This thruput is now over 30% greater than the Dec '03 requirement, so is now rated "G ood" for that requirement (was "Adequate" last month).

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5) NSIDC:

Rating: Continued **Good**

GSFC → NSIDC Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	MRTG	TOTAL
GSFC-DAAC → NSIDC	70.6	48.9	32.2	9.2	58.1

Requirements:

Date	mbps	Rating
Oct '02	29.2	Good
Dec '03	53.1	Adequate

Testing to NSIDC from GDAAC via EMSnet improved 22 October, with the discovery that FEWER parallel TCP streams would improve thruput! (Reduced testing to 3 streams – median thruput had been 34 mbps with 5 streams). This is still rated "Good" compared to the reduced Oct '02 requirement, but improves to "adequate" vs. the higher future requirement.

After analyzing this condition, it was determined that the host being used for testing at NSIDC was connected by a half-duplex Ethernet connection, which was limiting performance. So in November, testing was moved to a host at NSIDC with full-duplex connection, and performance improved further.

Other Testing:

Source → Dest	Medians of daily tests (kbps)				
	Best	Median	Worst	Requirement	Rating
JPL → NSIDC-SIDADS	5584	3986	2957	260	Excellent
LDAAC - NSIDC	4795	4619	4156		

Performance is very steady from both sources. Thruput from LDAAC jumped to about 6 mbps at the end of October – details next month.

6A) US (GSFC) → NASDA: Rating: Continued **Adequate**

Test Results:

Source → Dest	Medians of daily tests (kbps)				
	Best	Median	Worst	MRTG	TOTAL
GSFC-CSAFS → NASDA-EOC	2165	1814	607	500	2314

Requirements:

Source → Dest	FY	kbps	Rating
GSFC → NASDA	Oct '02	1854	Adequate
GSFC → NASDA	Dec '03	1620	Good

Performance steady -- about as expected for the 3 mbps ATM PVC (using multiple TCP streams to mitigate TCP window size limitation at NASDA).

6B) NASDA → US (GSFC): Rating: Continued **Adequate**

Test Results:

Source → Dest	Medians of daily tests (kbps)				
	Best	Median	Worst	MRTG	TOTAL
NASDA-EOC → GSFC-CSAFS	1402	1285	575	95	1375

Requirements:

Source → Dest	FY	kbps	Rating
NASDA → GSFC	'02, '03	1374	Adequate

Performance continues stable on new circuit – but median had been 1.5 mbps on the old circuit. MRTG shows that usage dropped about in half last month. Performance is still limited by the TCP window size on NASDA's test machine. NASDA has installed updated scripts, and should be able to use multiple TCP streams soon – expected to improve thruput.

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7) GSFC → ERSDAC: Rating: Continued **Good**

GSFC → ERSDAC Test Results:

Test Period	Medians of daily tests (kbps)				
	Best	Median	Worst	MRTG	TOTAL
4-Jun-02 – 31-Oct-02	795	771	460	73	844

Requirements:

Source → Dest	FY	kbps	Rating
GSFC → ERSDAC	'02, '03	467	Good

Performance using the 1 mbps ATM connection (since June '02) is very stable. However, the requirement was raised last month from 275 kbps to 467 kbps (1 IST @ 311 kbps * 1.5 Contingency), so the rating is now "Good"